

SCIENCE

FRIDAY, JULY 27, 1888.

THE WANT OF A COMPLETE REPORT on the mineral resources of Ontario has long been felt, and, in response to the general wish, on the 14th of March last a resolution was carried in the Legislative Assembly authorizing the government to appoint a royal commission to investigate and report on this subject. Acting on this resolution, the Council on the 8th of July appointed the following gentlemen a commission for the above purpose: John Charlton, M.P., Chairman; Robert Bell, Assistant Director of the Dominion Geological Survey, Ottawa; William Hamilton Merritt, mining engineer, Toronto; William Coe, proprietor of iron mines, Medoc; Archibald Blue, Deputy Minister of Agriculture, Secretary of the Commission. The commissioners met the members of the government by appointment in Toronto on Saturday, July 12, when it is understood a programme was agreed upon, the particulars of which, however, have not been made public.

TWO IMPORTANT EXPEDITIONS left Rio de Janeiro in June for exploration and work in two of the least-known parts of the Brazilian territory. The first, sent out by the Ministry of War, under the command of Capt. Bellarmino Mendonça, is to open a road from the town of Guarapuava, on the frontier of the settled portion of the province of Parana, to the confluence of the rivers Parana and Iguassu, and to found a military colony at the latter point. A road is also to be opened along the Parana river from the mouth of the Iguassu to the navigable portion of the river above the Sete Quedas fall, and from this point to Guarapuava, via the valley of the Piquiry. The founding of a colony at the mouth of the Iguassu, where the Argentines are already establishing themselves, will, aside from its military importance, prove of great value in peopling the valley of the upper Parana, which has been deserted since the time of the expulsion of the Jesuits. By means of the lower Parana the colony will have free water communication with Buenos Ayres and other markets of the Argentine Republic, where two of its natural products, lumber and matte, will find a ready sale. This will give at once to the proposed colony a commercial importance, far beyond that of a purely military station, and will doubtless lead to the rapid spread of population along the upper Parana and its tributaries, with their hundreds of miles of navigable waters. The second expedition, consisting of three military engineers, Capt. Lourenço Telles and Lieutenants Miranda and Villeray, is sent out under the auspices of the Sociedade de Geographia de Rio de Janeiro, the expenses being borne by the Ministry of Agriculture. It is to proceed to Cuyaba in the province of Matto Grosso, pass by land to the headwaters of the Paranatinga, and descend that river and the Sao Manoel or Tres Barras to the Tapajos, returning to Rio de Janeiro via Para by the Tapajos and Amazonas. This exploration will thus be a valuable complement to that of the Tapajos by Chandless, as the Sao Manoel and Paranatinga are almost absolutely unknown.

A FULL REPORT of a recent lecture on personal identification, by Mr. Francis Galton, appears in *Nature* for June 21 and June 28. Mr. Galton here presents a practical application of his favorite pursuit, the accurate description of physical and mental peculiarities. He proposes a very ingenious scale of divergencies from the normal for any one feature, and has even invented a mechanical device by which the tedious labor of arranging a large number of such ob-

servations can be much abbreviated. The anthropometrical laboratory, at which any one can, under proper restrictions, have a record made of his chief physical measurements, is now open in London, and promises to yield valuable material for this line of study. In connection with this work Mr. Galton has studied the striations of the human fingers, and is able to corroborate the value attributed to them as a means of identification. These markings are easily obtained, and the variety of them is larger than one would *a priori* imagine. The markings of a finger of Sir William Herschell made in 1860 and 1888 respectively are figured, and show a striking similarity. The difference in age of the two prints testifies to the wearing of the epidermis. The study is still in its infancy; but the success of such measurements for identifying criminals, as exhibited in France, promises to draw more general notice to the subject.

A CABLEGRAM RECEIVED in Philadelphia, Penn., announces the death of Henry Carvill Lewis, geologist, at Manchester, England, on Saturday, July 21. Professor Lewis was born in Philadelphia on Nov. 16, 1853. He was graduated at the University of Pennsylvania in 1873, and in 1879 joined the State Geological Survey as a volunteer, and first investigated the surface geology of southern Pennsylvania; after which he studied the glacial phenomena of the northern part of the State, and traced the great terminal moraine from New Jersey to the Ohio frontier. He furnished numerous papers on the geology and mineralogy of Pennsylvania to the Proceedings of the Philadelphia Academy of Natural Sciences. He was elected professor of mineralogy in the Academy of Natural Sciences in 1880, and to the chair of geology in Haverford College in 1883. These positions he held at the time of his death. Since 1885 he had been engaged in geological studies in Europe, working at microscopic petrology in the University of Heidelberg; and had completed a map of the separate ancient glaciers and ice-sheets of England, Wales, and Ireland. Professor Lewis was a member of a number of scientific societies in the United States and Europe, and contributed to their Proceedings and to other scientific periodicals, including the *American Naturalist*, of the mineralogical department of which he was for some time editor. It was at the British Association meeting held at Birmingham in September, 1886, that he read his first paper on 'The Genesis of the Diamond,' and in describing the peridotite of the De Beers mine, and that from Kentucky, he suggested interesting possibilities in regard to the latter locality. Since then he was actively engaged in the fuller preparation of his paper on 'The Genesis of the Diamond,' visiting all the localities in the Southern States where diamonds have been found; and it was undoubtedly his intention to read this paper at the coming meeting of the British Association in September, and then to continue his geological studies in Norway, remaining in Europe for three or four years. Professor Lewis was an indefatigable worker, of keen perception. Genial in his manner, he made many friends; and although he had not reached the prime of life, yet his work is known to the entire scientific world, and he gave promise of having entered upon a long life of usefulness. In him science has lost a valuable worker, and society a useful member, and he leaves a blank which will not be readily filled. He leaves a wife and one child.

IN SPITE OF THE USUAL vexatious delays, which often prevent the opening of new buildings at the appointed time, the new Marine Biological Laboratory at Wood's Holl, Mass., was formally

opened on the day appointed, Tuesday, July 17. The exercises were of the simplest and most informal character, as no programme had been arranged and no ceremonies were expected or desired. Nevertheless, several members of the Board of Trustees, a few students, and a half dozen or more of guests were present, and spent the morning in examining the new building and its equipment, and in visiting the laboratories and aquaria of the United States Fish Commission. At two o'clock the whole party dined at Gardiner Cottage, — the domestic headquarters of the new enterprise, — which a generous citizen of Wood's Holl, Mr. J. S. Fay, has kindly put at the disposal of the trustees. Shortly after three o'clock the Director, Dr. C. O. Whitman, delivered in the laboratory an opening address upon the history and functions of marine biological laboratories, referring especially to the Penikese School and to Professor Baird's labors in this direction. It is earnestly to be hoped that this address, which seemed to those who heard it unusually thoughtful and adequate, may be printed. Professor C. S. Minot then said a few words on behalf of the trustees, and the exercises were over. The trustees appear to have done wisely in deciding to make a beginning this year, for, notwithstanding the fact that the announcements were not made until most students and investigators had formed their plans for the summer, some eight or ten students are already at work in the laboratory. The responses from colleges and from students make it certain that another year will witness here a large and enthusiastic gathering of investigators and students in biology. The building appears to be admirably adapted to its purposes. It is plainly but strongly built, of wood, two stories high, and with a pitched roof. The roof and sides are covered with shingles, unpainted. There is a commodious and convenient basement under the western half of the building, intended for storage, for the safe keeping of alcohol, boats, oars, and the like. The lower floor of the laboratory is intended for beginners, and for teachers and students who are learners but not investigators. The upper story is for investigators only. The equipment includes work-tables, specially designed, and placed before the large and numerous windows. Each student is provided with a Leitz microscope, a set of re-agents, watch-glasses, dissecting pans, and the dishes and other things indispensable to good work. The laboratory owns boats, dredges, nets, and other tools for collecting. A small library has been provided, and, under the progressive and efficient management of Dr. C. O. Whitman and Mr. B. H. Van Vleck, a season that promises to be highly successful, and most important in the history of American biology, has been auspiciously begun.

THE NEW DEPARTMENT OF LABOR.

THE President's signature, July 11, of the legislative bill containing the appropriations for the new Department of Labor has completed the establishment of Col. Carroll D. Wright's bureau on a permanent and firm footing. The re-organization has, it is true, been more nominal than real. The force of men has not been increased, but a large number of clerks and experts who were formerly on the temporary roll have been transferred to the permanent one. The effect of this upon the character of the work they will do in the future is expected to be very beneficial. They have been trained for their work, but the uncertainty of their tenure of office — the danger that they might at any time have been dismissed by a failure of Congress to appropriate money for their salaries — has not encouraged them to work with that zeal that it is expected that they will manifest now that their permanent employment is provided for by the organic law of the Department of Labor. These remarks should not be construed as a criticism of the work of the temporary employees of the Bureau of Labor, for it is not open to such criticism, but to show the inevitable tendency and influence of uncertainty of tenure of office upon the work of any class of men, and the expected effect of permanency.

The scope of the work of the new Department of Labor is not much greater than that of the Bureau which it succeeds, but, un-

der the new law, the Commissioner is directed to pursue certain lines of investigation which he pursued before only by authority of appropriations made from time to time, and which there was danger that some economically disposed Congress might now and then omit.

The Department of Labor is now engaged in making inquiries in three directions. The investigation to ascertain the economic, social, and moral condition of the working women of the leading cities of the country, which has been in progress for several months, is substantially completed, and its results will be set forth in the next annual report of the department to be presented to the President next December. The inquiry in regard to marriages and divorces is also substantially finished. This will be the subject of a special report, which will also be published about the time Congress meets next winter. A great amount of material bearing upon the condition of the railway employees of the country has already been accumulated in the department, and the work in this line of inquiry is progressing very rapidly, so that the report will be ready for the printer about next December.

This railroad inquiry has been pursued along two lines. The agents of the Department of Labor are gathering all the data to show the material and social condition of the railroad men of the country, their hours of labor, tours of duty, styles of living, beneficial organizations, etc. But Colonel Wright desires to embody in this report not only the rates of wages which are paid to these men, but also how much they actually earn in a year after all lost time has been deducted, and why the time is lost. The only way in which this information could be obtained was by an examination of the pay-rolls of the different railroads of the country. In most instances the railway officials have promptly and cheerfully responded to Colonel Wright's request by sending to Washington their pay-rolls for a year. Not one railroad company has refused to allow its pay-rolls to be examined, although some have preferred that the tabulations be made in their own offices. This report will be of especial interest in view of the frequent controversies between railroad managements and employees. It will show whether, as a whole, the railroad men of the country are required to work more or fewer hours than other workmen, what their annual earnings are, and what is their social condition.

The inquiry provided for in the organic law of the Department of Labor in regard to "the cost of producing articles that are dutiable in the United States, in leading countries where such articles are produced, by fully specified units of production, and under a classification showing the different elements of cost, or approximate cost, of such articles of production, including the wages paid in such industries per day, week, month, or year, or by the piece; and hours employed per day; and the profits of the manufacturers and producers of such articles; and the comparative cost of living, and the kind of living," will be begun next fall, and the report will be ready for submission to the Fifty-first Congress at the opening of its first session. Statistics of this kind, in the honesty and impartiality of which representatives of both political parties had confidence, as they have in all statistics to which Colonel Wright puts his name, would have been of incalculable value in the tariff debate that is now in progress. Scores of members of Congress have applied at the Labor Bureau for just such figures as this inquiry will furnish.

Colonel Wright thinks that one of the most important provisions of the organic act of the Department of Labor is that in which he is "specially charged to investigate the causes of, and facts relating to, all controversies and disputes between employers and employees as they may occur, and which may tend to interfere with the welfare of the people of the different States." Experience has shown that it has been almost impossible, even for the sharpest newspaper reporters, to ascertain, when a great strike occurs, which side is in the right and which is in the wrong, or how far each is right and each wrong. The employers state their side of the dispute, concealing any thing that may be unfavorable to them, and the employees do the same. If the exact facts could be known to the public, popular sentiment would very soon decide which was right and which was wrong, and the latter would have to yield to this sentiment without much delay.

The Department of Labor has the machinery for gathering the

facts in regard to a great strike impartially, and publishing them within a few days, while the strike is still in progress. In very striking contrast with this are the ridiculous attempts of committees of Congress to investigate strikes. These inquiries, even if they begin when the strike is in progress, are never completed until long after it is over; and by the time reports are made, popular interest in the matter has entirely died out. Besides this, the testimony which a committee of Congress makes is jumbled together without any regard to order, and from this incongruous mass it is impossible for any one to get an intelligent idea of the facts.

Twenty-one of the States now have bureaus of labor statistics, and an effort is now making to bring about among them a uniformity of organization and methods of work, which shall also be in harmony with those of the national Department of Labor. When this is accomplished all of these bureaus will be able to co-operate with and supplement the work of each other, to the mutual benefit of all.

It is worthy of remark in closing that no European country, until recently, has had any system of gathering social statistics such as the Department of Labor is publishing from time to time. In most countries the authorities would hardly dare to institute such a system of inquiries, or, if they did, they would not dare to publish them. Belgium has lately established a bureau of statistics modelled after our Department of Labor, and a beginning has been made in England. That the scientific value of the work of the Department of Labor is also recognized in almost every foreign country is evidenced by the numerous letters that have been received from distinguished scientific men abroad, and by notices of its publications that have appeared in most of the scientific periodical publications of Europe.

THE BENDEGO METEORITE.

THE famous Bahia or Bendego meteorite described by Mornay and Wollaston in the *Philosophical Transactions* for 1816, and by Spix and Martius in their 'Travels in Brazil,' was landed in Rio de Janeiro on June 15, and is now in the collection of the Brazilian National Museum. The transportation of this great mass of iron, whose weight was variously estimated from six to nine tons, and which has been found to weigh 5,361 kilograms, was rendered possible by the recent completion of a line of railroad passing within one hundred and fifteen kilometres of the Bendego Creek, where it has lain since the unsuccessful attempt to remove it to Bahia in 1785.

As there was little prospect of a nearer approach by rail in the immediate future, the authorities of the National Museum attempted last year to stir up an interest in government and private circles for the removal of the meteorite to Rio de Janeiro. Almost immediately after the subject was broached, Chevalier José Carlos de Carvalho, an ex-naval officer who had some experience in the transportation of heavy masses of ordnance in the Paraguayan war, took up the idea with great enthusiasm, and proposed to the Sociedade de Geographia de Rio de Janeiro that the society should undertake the removal, offering at the same time to take charge gratuitously of the technical part of the operation. This proposition, which was heartily supported by the president of the society, Marquis Paranagua, was at once adopted, and a committee, with Mr. Carvalho at the head, was appointed to raise the necessary means by a popular subscription. This work proved unexpectedly easy, as a prominent and wealthy member of the society, Baron Guahy, offered, as soon as the matter was mentioned to him, to defray all the expenses. The project was also warmly espoused by the Princess Regent, and by the Minister of Agriculture, Counsellor Rodrigo Silva; and everything depending on the government, such as transportation, material from the arsenal and railroad shops at Bahia, etc., was placed at the disposition of Mr. Carvalho, and two government engineers, Drs. Vicente de Carvalho and Humberto Anuores, were detailed to aid in the undertaking.

After about three months spent in preparing material and in studying the route to be traversed, the march commenced on the 25th of November, 1887, and the meteorite was placed on the railroad on the 14th of May of the present year. A road had to be opened for this special purpose, as those existing in the region are

only mule paths: over one hundred streams, one with a width of eighty metres, had to be crossed by temporary bridges. The route lay over several chains of hills and one mountain range, in which an ascent of 265 metres had to be overcome with a grade of 32 per cent. In overcoming these many and serious obstacles Mr. Carvalho and his companions gave a brilliant and practical rebuttal to the somewhat widespread, but unjust, notion among foreigners that the Brazilian character is deficient in the qualities of ingenuity, energy, and perseverance; while on the other hand the generous donation of Baron Guahy, amounting to about ten thousand dollars, proves that wealthy and public-spirited Brazilians can be counted on for pecuniary aid for scientific purposes when once the matter is properly brought to their attention.

Important aid was also rendered to the enterprise by Drs. Luiz da Rocha Dias and José Ayrosa Galvao, chief engineer and first assistant of the government railroad line in Bahia; by Richard Tiplady, Esq., superintendent of the Bahia and San Francisco Railroad; and by the firm of Claudio de Vicenzi & Co., owners of the steamship Arlindo, on which the meteorite was given free transportation from Bahia to Rio de Janeiro.

THE HEMENWAY-CUSHING EXPEDITION.

MR. FRANK H. CUSHING, whose wonderful discoveries in regard to the customs and religion of the Zuñi Indians, made during his residence among this remarkable people, are recognized as the most valuable of recent additions to American ethnologic knowledge, has spent the past winter and spring, as may be known to many readers of *Science*, in Arizona, making explorations of extensive ancient ruins there. The expenses of this expedition, which is well equipped, are paid by Mrs. Hemenway of Boston, the lady who has lately shown such substantial interest in Mr. Cushing's work. That gentleman had reached a point in his studies of the Zuñis that, in order to pursue them further, it seemed necessary to attempt to trace their history back to the beginning by an examination of the ruined cities and temples in which their ancestors lived and worshipped. This is the object of Mr. Cushing's recent work. Attached to this expedition, during the past winter and spring, was Dr. James L. Wortman, of the Army Medical Museum, who has recently returned to Washington. His mission was chiefly that of an anatomist engaged in anthropological work. The Medical Museum has been engaged for several years in the collection of human skeletons for the purposes of comparison, and the net result of Dr. Wortman's labors during the past winter and spring has been the securing of about one hundred complete skeletons, the skulls of which are in a good state of preservation, although the rest of the bones are more or less imperfect.

In an interview since his return Dr. Wortman has given the first account of Mr. Cushing's latest work that has been published, and from a report of this interview the following brief description of the explorations of the expedition and their results has been made up.

The scene of Mr. Cushing's explorations is the wide valley or plain at the confluence of the Salt and Gila Rivers in south-western Arizona. To-day railroads cross this valley, and much of it has been reclaimed by irrigation from the desert condition into which it relapsed when the ancient inhabitants disappeared. Still a wide expanse of the plain, which is forty-five miles across, remains a desert covered with sage-brush, cactus, and mesquite. It slopes from the Salt to the Gila River, and advantage was taken of this feature of its topography by the ancient people in constructing canals to irrigate the whole plain. In some places these old canals have been re-opened by the modern farmers, and restored to their original use. On this wide plain are many groups of mounds, in excavating which Mr. Cushing has discovered many ancient cities, to some of which he has given the names of Los Muertos, Los Hornos, Los Guanacas, Los Pueblitas, Los Acequias, etc. Los Muertos, the city of the dead, has been traced for three or four miles, and forty or fifty huge structures or communal houses in it have been examined.

The surface indications of these cities are a series of truncated mounds twenty or twenty-five feet high, surrounded by a great number of fragments of ancient pottery. The cities consist of irregular groups of houses built along the banks of the canals.

In the ruins of these structures, Dr. Wortman says, the greater part of the specimens have been found. The houses are rather large, 300 or 400 feet long and 200 feet wide, possibly larger. They were generally built of adobe bricks, sun dried, without straw or admixture of cement of any kind. In some instances, Mr. Cushing thinks, they were four or five stories high, but this can only be conjectured from the size of the mounds, the thickness of the walls, and the quantity of the *débris*. All that now remain are the foundation walls, and around and within them the *débris*. These houses seem to have been constructed on the same plan as the pueblos of the Zuñis, the Moquis, and other existing pueblos. In Casa Grande a cement is found to have been used on the outside and inside of the structure. The builders were probably acquainted, as the Aztecs were, with some sort of cement, which they used to protect their structures from the weather. In some instances it was found that, instead of building with adobe bricks, upright posts had been set up. The space between was wattled with cane or willow, and then filled with adobe. The woodwork has entirely disappeared, there being nothing left of it except occasional bits of charred wood. The post holes are still there, and show the manner of construction.

The dead were buried in the houses. Below the floor of the house a vault was dug, and the body, first wrapped in cloths of some description, was deposited in this sepulchre. Then the grave was filled with adobe, which was packed around the body. Food-vessels and water-jars were also buried with the dead. With the body of a man of consequence, war-clubs, images of various kinds, arrows, and other articles were also interred, but, of course, only the most imperishable remain. Sometimes two or three bodies have been found in the same sepulchre, and it is believed that where two are found in one grave they were man and wife. The skeletons are not well preserved, and crumble after a few hours' exposure to the air. The bodies were wrapped in cotton cloths, as is shown by the impressions left in the adobe, or mud, which was soft when it was first packed around them. In some instances the fragments of cloth have been found. It is of rather fine texture, and the size of the cavities in which the skeletons are now found proves that the bodies must have been wrapped thickly, so that little or no moisture had access to them. Such being the case, the condition of the bones, especially when the dryness of the climate of Arizona is considered, indicates a great antiquity for these burial places.

The tombs already described appear to have been those of the priestly class. The bodies of the common people were cremated. In connection with each house supposed by Mr. Cushing to be the house of a clan or one of the sociological divisions, such as are found among the Pueblo Indians, was what the explorer calls a pyral mound. On this the bodies and effects of the dead were consigned to fire. This mound is eight or ten feet high, and is composed entirely of the accumulations or *débris* resulting from these cremations. The ashes and charred bones of each body were collected and placed in an urn, which was buried at the foot of the mound from six inches to a foot below the surface. In some instances as many as 400 or 500 of these urns were found buried about a mound.

Between forty and fifty of the large, or communal, houses were found in Los Muertos. In the centre was a structure larger than the others, which Mr. Cushing called a temple. In this building, which was enclosed by a strong adobe wall, and in no other, were bodies found deposited in an upper story. Here there were four or five adobe sarcophagi, two of which were placed nearer the centre of the building than the others, were more conspicuous, and contained what appeared from the skeletons to be the remains of men of advanced age. Mr. Cushing said that extra decorations were found on these two sarcophagi. It is supposed that this was the home of the chief ruler of the tribe, the chief priest, or some one of exceptional note. The object of the wall surrounding the structure was probably to make it a stronghold or citadel in time of war. The temple might also have served as a general storehouse for provisions.

Other structures of a peculiar character were discovered. They were circular, and in the centre of each was a fireplace. One of these was found in each city. Mr. Cushing thought that this

round structure was a temple of the sun, or something of that sort, as nothing was found in them but the fireplace and broken pottery. The one most carefully excavated was forty or fifty feet in diameter.

This ancient people built all their houses on the main line of the irrigating canal. This irrigating system was extensive. The many ditches and canals were constructed on a peculiar plan. A cross-section shows a series of terraces. At the bottom is a central ditch, and above this, widening to the top, are terraces. The large canals are about twenty-five feet wide at the top, the central ditch being four or five feet wide. Mr. Cushing believes the canals were used not only for irrigation, but for navigation as well. "We know," said Dr. Wortman, "that the inhabitants of these towns used timbers of considerable size in their building operations. The only available wood in the immediate vicinity was cottonwood or mesquite, which would not serve their purpose. They used pine, and the nearest point where they could get lumber of that description from was seventy-five or a hundred miles away. Timbers of a size required by them in the construction of their buildings could not be carried such a distance on the backs of men. The conclusion is that they floated them down the Gila or Salt River. Certain remains have been found indicating that they constructed of reeds rafts, or balsas, such as are found in Mexico and the South Sea Islands. Stones of considerable size, not found on the plains, were taken to the towns from the mountains. It would have been impracticable to have carried these stones such a distance unless they were floated on rafts.

"To conduct water from one level to another in these canals was a gigantic undertaking, especially when the character of the implements used is considered. They had no tools except stone ones in making their excavations. A few copper implements were found, but metal was scarce. Copper was used for ornaments, earrings, and bells. There was not enough, it is supposed, to use for agricultural implements. The irrigating system is sufficient in extent to render the whole extensive valley fertile. The beds of the canals were puddled. Soft mud was packed down well, and then burned or baked by filling the canal with brush and setting fire to it. When constructed this way the lining was almost as hard and impervious to water as terra-cotta pipes. They lost but little water, and the people were extremely economical of water. In some places large ditches terminated in great reservoirs. In these probably water was stored to be used in times of drought. The longest irrigating ditch was probably about twenty-five miles long. The river has perceptibly gone down in its bed since water was taken from it to fill these canals."

The theory that these towns were occupied successively is disproved, Dr. Wortman thinks, by the fact that some towns are twenty-five miles from the river, and all the intervening space is covered with ruins. Canals were constructed from the river to the furthest town. If the towns were successively occupied there would have been no necessity for constructing these irrigating canals. The enormous labor expended with stone picks for excavating and baskets for carrying away dirt in extending these irrigating ditches to these distant points indicates plainly that all the land between them and the river was occupied.

Mr. Cushing's party found on the rocks of neighboring mountains petroglyphs, or crude etchings. All illustrated matters of a realistic nature, and did not record the history of an individual or of a nation. They represented men offering prayers for rain, or herders or hunters offering sacrifices. These rock pictures are interesting, however, as bearing upon the question of the use of domestic animals by these people, and their probable acquaintance with the use of wool. In these petroglyphs appear representations of animals much like the llama of South America. They are represented in a position or attitude that the llama habitually assumes. They are so pictured as to lead to the conclusion that they were domestic animals. They are connected with a string or cord, a man having hold of the string and appearing to be driving them.

Mr. Cushing has also found in the ruins a number of terra cotta figures, representing various animals that were hunted, — the mountain sheep, the deer, the fox, the coyote. In one case a number of figures of animals corresponding in appearance with those pictured were found buried together. Mr. Cushing came to the conclusion

that these were a herder's sacrifice. Instead of sacrificing the animals themselves he substituted the images. The animal represented undoubtedly resembles the llama. It is quite different from the mountain sheep or any other animal corresponding in size, and has a long neck. If it is true that they possessed a domestic animal of this species, either the people were of very great antiquity or there was a species of llama in North America at a much more recent date than scientific men suppose. It is a matter, too, of extraordinary interest and significance, if these people had the same domestic animal as that found among the Peruvians when the Spaniards first came to this country. If they had such a domestic animal they undoubtedly took its fleece for clothing, and had woollen as well as cotton fabrics. Some of the earlier Spanish explorers speak of woollen cloth in the possession of the Pueblo Indians. If there is truth in that, then it is more than probable that these people possessed a domestic animal of the llama species probably as large as a good-size sheep.

These people had access to the Gulf of California. This is proved by the discovery of shells in the ruins which have been identified as belonging to the Pacific coast. Though at a considerable distance, they probably had communication with the sea-coast and obtained shells by bartering with other Indians. Of some of these shells skilfully carved ornaments are made. Mr. Cushing found a frog carved from a shell, the back being inlaid with turquoise. The inlaying had been done by cutting little square holes in the shell and fitting pieces of turquoise to them. A native species of lac was used in cementing the pieces. This lac was used also in basket-work. They made carved bracelets, earrings, and finger rings, and various ornaments inlaid in the manner described.

The petroglyphs did not throw much light on the manner of dress that prevailed, as they showed only the costume worn at certain ceremonials, — a long gown extending down almost to the feet. Near the skeleton of an old war-chief was found a fragment of a gown that must have been richly embroidered in various colors. It was badly decayed, but there was enough left to show that it was an embroidered garment.

"The antiquity of these ruins is not settled," said Dr. Wortman. "It has been maintained by respectable authorities that these ruins were occupied within the historic period. I don't think that can be possible. Historic evidence is decidedly against it. We have some records of the earliest Spanish explorers bearing on that point." Dr. Wortman stopped here briefly to summarize the history of the explorations of Cabeza de Vaca, prior to 1530, and of his immediate successors, Father Nisa and Coronado. Coronado's route, he said, to Casa Grande could be easily traced. There he found the ruin now standing, and gave a description of it by which it could be recognized to-day. "If it be true," said the doctor, "that Casa Grande, or Chichillecato, the Red House, a ruin still standing three stories high, twenty-five or thirty miles from Los Muertos, was in ruins when the Spaniards came there, as the records of Coronado's expedition in 1540 plainly indicate, assuredly these houses that Mr. Cushing is excavating, now practically levelled to the ground, had disappeared long prior to that period. In all the excavations Mr. Cushing has made, in the thousands of specimens collected, not a single specimen has been found that would give evidence of contact with whites. My own opinion is that the ruins are pre-Columbian, and if I were going to give a guess I would say they are not less than a thousand years old. The size of the mesquite trees growing from the mounds, indicates a great age."

"Considering all the evidence," said Dr. Wortman, "I have no doubt that when these ruined towns were inhabited, this valley, many miles in extent, was a fertile region, occupied by a thrifty people. They raised cotton, corn, and tobacco. Fragments of cotton have been dug up, tobacco has been found in their sacred cigarettes, and charred corn-cobs also remain to give evidence as to the agricultural products of the valley. As to the population, allowing even a greater number of acres to the man than is now cultivated by the Pima Indians, who, besides supplying their own wants, raise a large quantity of wheat to sell, allowing, say from five to eight acres to a man, the population of the valley must have been at least 200,000, if, as I believe, all their towns were simulta-

neously occupied. There are evidences that the Zuñis of to-day are a remnant of these people.

The osteology of the people has not yet been thoroughly studied. The skeletons collected will be compared here at the Medical Museum, and the careful study of them will undoubtedly throw much light on the relations of these people to historic people. The heads were short, or, in other words, the people were brachy-cephalic. They were small in stature. The general indications are that they are related to the Zuñis, and they are not unlike the Aztecs and Peruvians. Among the skulls I have found frequently the Inca bone or *Os Inca*, the extra bone in the back part of the skull, which received its name because it was a common thing among the Incas. These indications, with other evidences, suggest many interesting inquiries. It may have been that from this ancient civilization sprang that of Central America and of the Peruvians. A portion of the people may have migrated south, taking the llama with them, while others went north and founded the later Pueblo civilizations."

THE IMPARTIAL STUDY OF POLITICS.

SINCE Burke vindicated in such a memorable manner the party-system in politics, it has taken an extension which probably he never dreamed of. It is a curious speculation what estimate he would have formed of those larger developments of his principle which the nineteenth century has witnessed; for, indeed, there is a great distance between his cautious assertion that 'no men can act with effect who do not act in concert,' and some modern applications of the doctrine of concerted action. We cannot prevent or avoid parties. But let us, at least, be alive to the dangers that attend them. They act upon our habits of thought. They accustom us to consider public questions in a spirit as unfavorable as possible to the discovery of truth. They produce a kind of epidemic lunacy, such as history sometimes exhibits to us in nations that are on the eve of great disasters.

Some efforts have lately been made in England, similar to those now making in this country, to which we referred last week, to grapple with the specific evil of this mental disease produced by party spirit. These efforts have chiefly proceeded from the universities, and have been more or less connected with the movement of university extension. The Social and Political Educational League lately held a meeting, to which Prof. J. R. Seeley communicated an address he had delivered two years ago to a similar society, the Cardiff Association for the Impartial Study of Political Questions. This address we reproduce from the *Contemporary Review*. It was made to an English audience, but has much in it to make clear the problem to those of us in America who are interested in the scientific study of political questions.

The impartial study of political questions! If political questions — that is, questions of the public well-being — are all-important, if an interest in them is among Englishmen universal, it might seem scarcely necessary for you to found a society, or for me to deliver an address, in behalf of the impartial study of them. For surely all honest, serious study tries at least to be impartial. Surely there can be no more obvious cause of error than partiality. The judge, when he addresses the jury, warns them against yielding to bias or prejudice; the scientific man, in his researches, is especially on his guard against that tendency to a foregone conclusion which spoils all investigation and reduces it to a mockery. Surely there can be no exception to the rule that study should be impartial; surely there cannot be subjects in the study of which partiality is to be recommended or not to be condemned.

Yet somehow this undertaking of yours, that you will study political questions impartially, sounds strange and startling, and you seem to feel it so yourselves. Perhaps what is strange is that politics should be regarded and spoken of as a matter of study at all. Yes. Let us frankly admit that we may naturally be a little startled, a little alarmed, to hear politics classed off-hand, as we might class arithmetic or geography, among subjects of study. Politics concern our greatest interests, and therefore excite our warmest feelings; not among studies, not among sciences, we class them more naturally among higher things, by the side of religion, honor, morality. To be a politician is to be warm, eager,

earnest, devoted: the virtue of a politician is to be staunch and zealous in the cause he attaches himself to; and that sort of cold indifference which seems implied in impartiality appears not only not a duty, but actually a sin, in politics.

You do not mean, I am sure, when you undertake to be impartial, that you will for the future cease to be earnest and eager politicians; that you will renounce all strong, clear, sharply cut opinions; or even that you will for the future regard the strife of political parties with indifference, as if it no longer concerned you, much less with contempt, as if you were raised above it. And yet how can this be? How can you be impartial and partial at the same time? How can you at once maintain the passionless objectivity that befits the student, and the ardor, the unflinching decision, without which a politician is good for nothing?

There is no real difficulty here, and yet there is so much apparent difficulty that it is worth while to dwell for a moment upon the point. By partiality we do not mean strong and decided opinions. Of course, when you hear very unsparing and rancorous language used, very uncompromising courses recommended, you may suppose that you are among strong partisans; that is, partial people. But it is not necessarily the case. Opinions formed with perfect impartiality may be strong and uncompromising. The strongest opinions are often the most impartial, even when such opinions are most strongly and passionately expressed. I was surprised, the other day, to hear a friend say of M. Taine's book on the French Revolution that it was evidently partial. He said so because M. Taine has taken a very unfavorable view of the Jacobin party, and has spoken of them in very unsparing language. But does this, by itself, prove him to be partial? If so, what are we to do when we have to deal with great crimes and great criminals? Are we not to describe them as they are? Partiality means a deviation from the truth. When, then, the truth is extreme, terrible, monstrous,—and this is sometimes the case,—partiality would be shown, not by strong, but by weak language. If the Jacobins really were the monsters M. Taine believes them to have been, it was impartiality, not partiality, to describe them as he has done. Everything depends on the fact, on the evidence. Now my friend put the question of fact entirely on one side. He inferred the partiality of M. Taine immediately from the warmth of his language. What struck me was that he did not profess to have examined the evidence and found the charges brought against the Jacobins groundless. He only argued: The picture is extreme, therefore it must be partial. M. Taine writes with strong indignation, therefore we are not to trust him.

Now, I say, indignation, strong feeling, is not necessarily partiality, and therefore strong language is no proof of partiality. Partiality is the sacrifice of truth to a party. In order, therefore, to convict a writer of partiality, you must show that he was connected with a party at the time when he made his investigation, and that this has prevented him from discerning the facts or estimating them accurately. And yet M. Taine tells us that when he formed his estimate of the French Revolution he had no party connection. All the passion he now shows has been aroused in him, so he says, by the study of the facts, and therefore it cannot have prevented him from studying them properly. Nor does it now prevent him from seeing them; on the contrary, he feels it precisely because he sees them so clearly. Of course, my friend had a perfect right to arrive at a different conclusion. But, even supposing M. Taine to have made a great mistake about the Jacobin party, he would not, I think, be fairly chargeable with partiality. For partiality does not merely mean error or exaggeration; it means specifically that kind of error or exaggeration which is produced by judging of things under a fixed prejudice, under a party bias.

This, at any rate, is what you mean when you undertake to study politics impartially. You mean merely that you will consider the facts without bias. You do not undertake that when you have considered them, no strong feeling or passion shall arise in your mind. You will not begin your studies with a political bias, but you do not undertake that your studies shall not give you a strong political bias. Nay, your object is to acquire a firm political creed. And what reason is there to think that this creed, when you have found it, will not be as sharply cut and positive as those old party creeds which you refuse to regard as authoritative? There is nothing

in the impartiality you aim at which is inconsistent with the strongest feeling or the most decisive action.

In a country like this, where party passion has been so much indulged and has burned so hotly, the opinion, the political creed, of most people has been imposed upon them like the religion in which they were born. They have lived in it as an atmosphere of which they were scarcely conscious; or, if they have become aware that questions have another side, that opinions different from their own are tenable and even plausible, they have soon found that it was not so easy for them to change their atmosphere; that they broke ties, disappointed hopes, suffered inconvenience, perhaps incurred serious loss, when they tried to establish an independent political position for themselves. You do not, I suppose, complain of this. You recognize that political activity imposes a certain amount of restraint upon individual opinion. I, for my part, should go as far as most people in admitting that there must be compromise, that there must be party-subordination, that we must sometimes waive a conviction, sometimes stifle a misgiving. Practical life has exigencies which the theorist is slow to admit. It would be so delightful if we could always act simply in accordance with our convictions. But, alas! it happens sometimes—nay, my historical studies lead me to think it most commonly happens—that men have to act on the spur of the moment, and must act with decision, when they are tolerably well aware that they have no solid opinion. Through the greater part of history, it seems to me, political action has been a leap in the dark. And yet the leap had to be taken. The problem has generally been, not, What is it right to do? but, Granted we do not know what is right, yet since we must do something, what will it be safest on the whole for us to do? In such circumstances the best course of action is but a make-shift, and a rude organization is prepared to regulate it. We select a leader in whom we hope we may confide, we rally round him and surrender our opinions to his. He shapes for us a creed to which we resolve to adhere, and which we try to regard as true enough for practical purposes. And then it becomes a virtue to be loyal to our party, and soon to be too nice about the party-creed, to indulge in independent thought or in impartiality,—all this begins to seem unpractical, perverse, fatal to party discipline, tending to confusion. Is not this unavoidable? Must we not make the best of it?

But now when such party-discipline is maintained for several generations together, the alloy of falsehood that was there from the beginning accumulates, until the quantity of it becomes prodigious. In the end, the heady, drugged liquor that we drink mounts to the brain; the fog of falsehood that settles over us, fed continually by speeches in Parliament, speeches at the hustings, speeches and leading articles everywhere, begins to blot out the very heavens, till we stagger, blinded and choking, in an atmosphere composed of the lies of many generations, which lie in layers one above another, where no breath of fresh thought has been suffered to disturb them. It is then that we begin, if we are wise, to say to each other, 'Come and let us make an impartial study of political questions.'

Surely such a crisis has now come upon us. The portentous disruption that we have just witnessed must surely give rise to a certain amount of political scepticism, must lead us to revise our method, and look with some little suspicion into the logic by which we have been in the habit of ascertaining political truth. Misgivings were hushed in the triumphant years when Liberalism marched from victory to victory. An observer, indeed, might find it hard to grasp the theory of the thing. By what process a new crop of liberal doctrines always sprang up when Liberalism seemed exhausted by success, how the new doctrines were so easily proved to be truly liberal even when they appeared inconsistent with the old, whether there was any limit to the power of developing new doctrines, similar to that which Father Newman attributed to the Catholic Church, with which Liberalism was credited,—these and a hundred other doubts occurred to the observer, but the party was not troubled by them. For why? The party was successful. The prodigious agreement and enthusiasm with which each new discovery was welcomed, the prodigious success which attended each new development, seemed like signs of a divine inspiration, and Liberalism, like Catholicism,—from which indeed it borrowed much,—overwhelmed opposition by an appearance of

unanimity, universality, and certainty. But this dream of unanimity is now surely dissolved. Under the name of Liberalism we see now what different, hostile views were confused together. The Utopia of a world governed by a consensus among all rational civilized people, where force would be scarcely needed except to control a few obstinately perverse representatives of the older state of things, surely this is gone. And if so, all the difficulty, all the bewilderment, comes back upon us. We must seek some other note of truth, now that the old Catholic one, — *quod semper, quod ubique, quod ab omnibus*, — in its modern paraphrase, the agreement of the civilized world, has failed us. What can we do then? What else in political questions but what we do in questions of another kind? If we would know the truth about a subject, we study it. If, then, we would know the truth about politics, let us devote ourselves to the impartial study of political questions.

For, after all, politics may be looked at in another, in quite a different way. Instead of an arena of contest, in which Tories, Whigs, and Radicals are marshalled against each other, in which the same old watchwords are eternally repeated, the same reckless popular arguments continually furbished up anew, — an arena, in short, of action and adventure, — we may speak of politics as a department of study, if not of science. We may talk of political science, or political philosophy. There is no difference of opinion about this. All parties have what they call their principles, profess to assert certain political truths, refer to great writers who are supposed to have established the doctrines which it is their business to reduce to practice. These principles, these doctrines, must clearly be matter of study. If they are erroneous, the party that founds on them must needs go wrong; so too if they have been misconceived or misapplied. How is it, then, that we hear so little of politics as a matter of study? How is it that they are not taught in schools or at universities?

Well, this is the way of the world. It is the fate of all great doctrines which have momentous practical applications to be lost in their applications, to fall into the hands of practical men who troubled themselves but little about their abstract truth, and think exclusively of making them prevail, and themselves prevail with them. Of the immense crowd that in a country like this take part in politics, only an individual here and there has any taste for the theoretic side of them. To the majority the principles are mere solemn platitudes which give dignity and respectability to the pursuit. For them the real business begins when the personal element enters, when elections take place, when A wins and B loses; or when an institution is attacked and a grand fray takes place, exciting all the emotions of battle and ending in a distribution of spoils. Not that they could do without the principles. No; half the pleasure of the fray consists in the proud sense of fighting for something great and high. They like immensely to feel themselves champions of the truth, crusaders. But their own business is with the fighting; the principles they take more or less on trust. Some one else, no doubt, has inquired and philosophized; they are content with the results. A grand war-cry is the main thing; this, and a short argument to save appearances, will suffice for the theoretical part. And so they plunge into the fray, not suspecting that in many cases the measure they support does not really embody the principle they profess, that sometimes the so-called principle is a mere ambiguity which sounds so grand just because it is hollow, and that sometimes when it is most solemn and most impressive it is nevertheless entirely untrue.

I wish people could understand that it is not enough to have principles, — they must have true principles. We talk sometimes as if principles were grand things in themselves: we admire great historical struggles, on the ground that it is a proof of a noble energy when people are found ready to make sacrifices for principle. Better, no doubt, is energy than mere stagnant indifference; but I often think we forget, or do not sufficiently consider, how great is the instinctive, almost automatic love of fighting in the human animal. Sacrifices for principle! Well, but was the principle true? Did the combatant, before he entered the fray, ponder conscientiously, methodically, the principle on which he acted? Did he impartially consider the question? For if not, and this is the commoner case, the struggle, war, or revolution was not really for principle: it was only an outbreak of the combativeness which

is our besetting sin, and principle was not really the motive of it, but only the pretext. History is full of these sham wars of principle, of which the main result is to bring the principle itself into discredit. In religion and in politics the noblest doctrines gradually lose their sacredness through being turned into the war-cries of hypocritical parties, — parties which professed to have been moved by these principles to take up arms, when in fact they took up arms for the fun of it, and then sheltered themselves under the principle.

No one has any right to talk of principles, either in politics or any other great subject, who has not made a methodical study of the subject. Principles of this sort do not come to us by inspiration. At this time in the world's history, when on every subject such stores of information have been collected, when method has been so carefully considered, and so many false methods have been exposed and renounced, we must cease to confound principles with party cries, or to imagine that any high-flown sentiment or jingling phrase is true enough to fight for or good enough to hold a party together. We must be serious. In other departments we have long been impatient of hollow phrases. In scientific investigation, for instance, the phrase, the swelling oracular maxim, is utterly discredited; it is scouted as mediæval, as belonging to an obsolete system. Principles of quite a different sort reign now in that department, — principles slowly arrived at, provisionally admitted, until a prodigious weight of experience confirms them, and if accepted at last, liable even then to disappear in further developments and higher generalizations. But it is still quite otherwise in the political world. There it seems that no corresponding advance has been made. There the old watchwords still reign; there the old, vague, blustering terms — liberty, equality, and the rest of them — and the old maxims, traditional commonplaces of party rhetoric, live on in a world where all else is changed. Surely, in these days we want words less pompous and more carefully defined, principles better tested and better suited to the modes of thinking of the age.

I do not know but that you may be disposed to regard me as something of a sceptic in politics. Not so, if it is scepticism to doubt whether truth in politics can possibly be attained, for I have more belief than most people in the possibility of giving precision and certainty to our knowledge in this department. But I am a great sceptic about the current political system. For, in the midst of all our party divisions, there has grown up a sort of accepted political creed, a doctrine which is held to be almost beyond controversy, the settled result of civilization and progress. It is supposed that all enlightened men are agreed upon this doctrine, and that by it all the principal questions of government are settled, so that really not much now remains open to question. I am indeed a great sceptic about this supposed creed of civilization. I believe it will not bear examination, and that scarcely any article in it is final. I believe that of those principles upon which all enlightened men are supposed to be agreed, many are not even true. That imposing semblance of a final agreement, in which before long all controversy will be merged, appears to me a complete illusion, an illusion of a very ordinary kind. The appearance of agreement is only the result of vagueness in the use of language; the fabric looks solid only because we are not allowed to come very near it; the propositions sound satisfactory only because they have never yet been analyzed.

How, indeed, *can* this system be true? Where, how, and by whom was it framed? It did not grow out of an impartial study of political questions. It sprang up in the midst of party controversy, in minds heated with opposition and contending for interests. Party conflict may be necessary, and for certain purposes good, but it is not a school for the discovery of truth. To discover truth requires impartiality first; next, contempt for mere popular success; then continuous, patient, often difficult trains of reasoning. All these are necessarily wanting in the party-strife, where votes must be obtained at whatever cost, and where it is vain to urge any thing, however essential to the demonstration, which is not popular, immediately intelligible, obvious to the meanest capacity. In those conflicts truth may be propagated, when it has been discovered by other means; but it can be neither discovered nor proved, and the most splendid triumph at the polling-booths leaves the question of truth precisely where it was. We could imagine a great and final system

of political truth springing up among us, if it were the work of political philosophers improving their methods and concentrating their efforts as philosophers have done in other departments, but it is not represented as having sprung up mainly in this way. By great party-conflicts, by acts of Parliament, which have settled great questions practically for us, it is supposed that in some way truth has been discovered or at least proved, as if the ballot-box could be an organ of scientific discovery. Though I use so many words, I do but say perhaps a little more strongly and decidedly what you affirm by the act of founding this society. You say we should study political questions impartially. I say we must put politics on a new basis, — on a basis of systematic and reasoned truth. We must have, not Whig and Tory principles, handed down to us from the party-conflicts of other times and enshrined in the rhetoric of ancient party-leaders, but principles of political science as taught by great thinkers and writers. Those great writers, whom we name with reverence, yet scarcely read, and seldom practically follow in our politics, must come now to the front, must take henceforth the lead. We must have masters whose style is calm, whose terms are precise, whose statements are duly qualified, who see both sides of a question, and who know the history of the past, — the Tocquevilles and the Mills, — and we must make up our minds that if any thing like agreement is ever to be reached on political subjects, it will not be by any amount of party agitation, or by any number of victories at the poll, but by a sufficient supply of such teachers, and by due docility in those who learn from them.

In other words, politics must become a branch of study, a matter of teaching and learning. But here, perhaps, I may seem to expect too much, and you may doubt whether your society can attempt a study which I represent as so scientific. You begin well by securing help from all the political parties. This, of course, is indispensable; and if you make due progress, the time will come when at your meetings you will have become so accustomed and so attached to the free scientific way of handling the subject, that you will almost forget the existence of those parties. I think you are right too, if, as I hear, you have decided not to proceed to a division at the termination of a debate. I like this, and think it is perhaps more important than some might suppose. Your object is to find the truth. Now a majority may be a very respectable thing, but it has no function in the investigation of truth. This is perhaps hardly a truism, if I may judge from the prevalent way of speaking. How often is some great act of Parliament, some reform bill, spoken of as if it had established a principle, as if in some marvellous way it had made something true and right which was not so before. But in the pursuit of truth the number of votes is of no sort of importance. It is so wholly indifferent which side has the majority that you can infer nothing whatever from it. A majority has, it seems to me, no particular inclination to take the right side, but also it has no particular leaning towards the wrong. It belongs to political action, and has no place in political study.

So far, then, it appears that you have made excellent arrangements for a political debating society. But allow me, first, to warn you against resting content with a mere debating society; and, secondly, to suggest the possibility that your present plan may not prove sufficient to meet all your wishes, and may call for additions and further developments.

First, a debating society, whether impartial or not, is still a society simply for making speeches. In the debating societies that I have known, speech-making has been an end and not merely a means, — nay, it has been almost the principal end. The main object which the members have had in view has been to acquire the power of expressing themselves in public with freedom and effect. No doubt, in any good debating society, the matter as well as the form of the speeches is considered; but distinctive excellence will appear chiefly in the form. Now what is it that you mean to encourage, just thinking on political subjects, or merely smart speaking? Do we want a new society for the purpose of training a few more of those talking-machines of which we have so many already, of encouraging that fluency in political platitudes which our party system itself encourages too fatally? I have assumed throughout this address that your object is precisely opposite, that you wish to acquire a firm grasp of principles, to lay a foundation of political knowledge in precise definition, luminous classification, trustworthy

generalization, authentic information. This you hope to do by the co-operative method, by a society, by meetings. I would ask you to consider carefully the regulations which will determine the character of your debates. Bear in mind that clearness of thought has one eternal enemy, — rhetoric. It is difficult to encourage eloquence and to encourage justness of thought at the same time and by the same methods. Your regulations ought to put some restraint upon the flow of rhetoric, to reduce as much as possible the temptations to display. Perhaps, for example, if you have some meetings where the audience is large, you might arrange to have other meetings smaller and more select. You might try to introduce dialectical discussion, which should proceed by rapid question and answer, objection and reply, and where the members should speak sitting. As your object is to assimilate political as much as possible to scientific discussion, you should study to borrow the forms of scientific discussion. Parliamentary forms, I think, should be avoided. Written papers should be encouraged, since writing almost imposes serious reflexion. It will be of no avail to eschew partiality, if you allow yourselves to fall into the snare of rhetoric. Tinsel phrases, the childish delight in uttering solemn periods and hearing the sound of applause, bias the mind not less powerfully than party connection.

Another difficulty occurs to me. You intend to discuss political questions. But is it so easy to decide what questions are political and what are not? Is it so easy to fix the limits of the political sphere? That question becomes urgent as soon as you begin to regard the subject seriously. Of course, if you are contented with delivering a series of set speeches which shall be greeted with applause, or if you intend merely to repeat the old story how the Whigs or the Tories have been always right and their opponents always wrong, the difficulty will not trouble you. But if you really entertain the notion of discovering truth, if you intend to investigate political questions seriously and renouncing all foregone conclusions, you cannot but soon make the remark how difficult it is to separate political questions from others which are not usually called political. If there is a science of politics at all, it must needs be almost the most complicated of all sciences. It deals with that curious phenomenon called the State, which is a kind of organism composed of human beings. The lives of individual men, even the greatest men, are included in the life of the State: almost everything indeed is included in it. Does not the very thought of studying such a vast comprehensive phenomenon, and of discovering the laws that govern it, give rise to a feeling of bewilderment? Does it not strike you that this study must rest upon other studies, that this science must presume the results of other sciences, and therefore that it cannot properly be studied by itself? Let me illustrate this by one or two examples. I will take almost at hazard some of the questions which are most likely to occupy you. I see on your list the question of free and fair trade. You will not doubt that this question is political: it is proved to be so by the plainest of all tests, for it decides votes at the hustings. But it is equally evident that the question belongs to political economy. The freedom of trade has formed the main topic of economists since the 'Wealth of Nations' was published. Here then politics run into political economy. If you seriously mean to form an opinion on this political question, how can you evade the economical question that lies under it?

Or take the Irish question, which has convulsed the nation so recently. That, if any question, is political. But in the discussion of it, what sort of argument is used? It is said that the act of union, by which the Dublin Parliament was brought to an end, was passed by corrupt means, that it did not receive the assent of the Irish people; and so on, and so on. Well, are these statements true, or are they not true? This is evidently a historical question. To answer it you must consult the record of occurrences which took place at the close of the last century. In other words, you must travel out of politics proper into history. Does not this example show you how far you run the risk of being led, what complicated inquiries await you? Indeed, it seems to me that that immense and pregnant question which was so suddenly brought before us, the question of home rule, involves the greatest of those principles which political thinkers, using a historical method and availing themselves of that vast supply of trustworthy historical information

which till a very recent time was wanting, have established. But have these principles been mastered as yet by our population? I think not. Our political commonplaces, those so-called principles the announcement of which sets all throats shouting and all hands clapping, are in a great degree exploded in the schools. In the schools the historical has supplanted the *à priori* method, whereas the party-world still lives in the dregs of eighteenth-century Liberalism. That impartial view at which you aim is, in fact, a historical view. When the party-scales fall from our eyes, what we see before us is simply history. "The thing which hath been is the thing which will be." Would you know what is wise and right in politics, you must consult experience. In politics, as in other departments, wisdom consists in the knowledge of the laws that govern the phenomena, and these laws can only be discovered by the observation of facts. Now, in the political department we call the observation of facts, history. If this is so, how can we avoid the conclusion that such a study of politics as you meditate cannot be separated from the study of history?

You will allow me, I am sure, thus frankly to point out the difficulties with which you will have to contend. It may prove that a more complicated machinery than you have planned is necessary in order to carry your purpose worthily into effect. And in that case it is, of course, possible that you may find on trial that you have undertaken more than you can perform in a manner thoroughly satisfactory. Even so your society might still be infinitely useful. Its discussions might be suggestive, even if they should not be exhaustive; they might give much, even if they should leave you hungering for more.

On the other hand, you may find yourselves able to give to your society that further development which the plan of it seems to me likely to require. What, in one word, is this further development? To discussion, it seems to me, you may wish to add methodical teaching, and to politics you may wish to add political economy and history. These, indeed, are vast additions; they would convert your debating society into something which we should describe by quite another name, into a sort of institute or college of the political sciences. You may not be prepared, and perhaps even it would not be wise, to look so far forward, to undertake so much at once, or even to indulge the thought of ever undertaking so much. But in a solemn commencement like this, it is impossible not to speculate, at least for a moment, to what height the seed now sown may conceivably grow. In an inaugural address, allow me to adopt for a moment the tone of an augur. It is now seventeen years since, in the Senate House of the University of Cambridge, I delivered a lecture on the teaching of politics. Ever since that time, but especially during the last ten years, I have observed in different parts of the country how the idea of regarding politics as a matter of teaching makes way, and how the demand for political teaching grows. The movement here connects itself in my mind with many similar movements which I have had the opportunity of observing, and therefore I think I can foresee the course it is likely to take. Now observe that if you find difficulties in realizing what you wish, you may get help. You want better knowledge, and you may possibly find, as I have said, the subject too vast for you to grapple with unaided. You may come to think that you want the help of economists and historians, if not of other classes of learned men. Your discussions may leave you craving for something more systematic; they may suggest doubts which you would like to refer to investigators of authority. If so, do not forget that the old universities are now very different from what they used to be. Whatever knowledge, whatever insight can be found there, is very much at your service. If in former times their studies were too little practical, had too little bearing upon the questions which agitate the world, this can scarcely be said now. If in former times the scholars of the universities were wrapped up in monastic seclusion and took little interest in the topics of the day, this again can scarcely be said now. But you are not likely to forget this, for I understand the university extension lecturers have visited this neighborhood. Possibly, however, it has not occurred to you that the two schemes, university extension and this Society for the Impartial Study of Political Questions, belong to and have an affinity with each other. We have at Cambridge economists, and we have also historians who do not shun the actual times in which we are all

living. In the extension scheme, and other similar schemes, we have a machinery by which these academic teachers are brought easily within reach of those who in great towns like this feel the want of academic teaching. I do not overrate the value of this kind of help. The time was, no doubt, when such scholastic politics would have been regarded with contempt, and I do not suppose that even now you are accustomed to expect much light upon practical questions from the collegians of Cambridge and Oxford. Nevertheless, I think you have found out already that they have something to give, and if you will only persist in appealing for their help, I believe you will be more and more satisfied with the result. The demand will create the supply. They will find out what you want, and gradually they will prepare themselves to give it. Here, then, is my suggestion. You seem to recognize already that you will need help of some kind. You have asked distinguished men, some of them strangers, to deliver lectures which are to be introductory to your discussions. I say, then, for the future, when you want such lecturers, go for them sometimes to the universities. And if you find, as you may do, that, on such a subject as free trade, for instance, a single lecture, or a pair of lectures, one on each side, is not sufficient, and rather disturbs your mind than quiets it; if you begin to see whole sciences and systems of thought lying under those political questions which you have undertaken to study impartially, then, I say, call the extension lecturers back to Cardiff, and supplement your debates by courses of lectures and by standing classes in political economy and in history.

You see, no doubt, what I aim at. What leads me to take an interest in your enterprise, what has caused me to accept with pleasure your invitation to deliver this address, is that I have recognized here another wave in the great tide of which I have for many years watched the advance. It is our part at the universities to give coherence, connection, and system to the thinking of the nation. I see everywhere how the nation begins to strive more than in past times towards such coherence. I am glad also to see how it learns the habit of looking to the universities for help in this strife, and how rapidly the universities are acquiring the habit and the skill to render such help; and I look forward to the time when the English universities will extend their action over the whole community by creating a vast order of high-class popular teachers, who shall lend their aid everywhere in the impartial study of great questions, political or other, and so play a part in the guidance of the national mind such as has never been played by universities in any other country. It is in this hope, and as a step to the fulfilment of it, that I inaugurate and wish all success to your society.

ELECTRICAL SCIENCE.

The Solution of Municipal Rapid Transit.

THE paper read by Mr. F. J. Sprague before the Institute of Electrical Engineers, on municipal rapid transit, is both valuable and timely. In the first part of the paper the inadequacy of the almost universal system of horse-car traction is pointed out, and a comparison is made between horses, cables, and electricity. Taking up horses, Mr. Sprague says: "Two distinct methods are recognized among street-car men in the handling of their stable equipments. In one the stock of horses is kept as low as possible: they are worked hard, making fourteen or fifteen miles a day, and the depreciation is heavy. In the other the stable equipment is increased, the horses are kept in excellent condition, their average daily duty is reduced to ten or twelve miles, and the depreciation is lessened." As an example of the equipment required, on the Fourth Avenue line in New York, run on the latter plan, the car day is eleven hours, and eight horses make about five trips, aggregating about fifty miles. To the number of horses is added ten per cent for illness, and ten per cent for emergencies; that is nearly ten horses for a car, making fifty miles a day. The average cost of motive power per car day throughout the United States is about four dollars, counting the cost of only those horses that are actually on duty. The cost per day per horse in New York is on the average fifty-four cents, and the cost for motive power per car mile ten cents.

The cable system has been successfully used where there are heavy grades and a great deal of traffic. In this system a cable is

run in a conduit between the tracks, and the cars make connection with it by a grip passing through a slot in the conduit. There are several objections to this system. One of the most serious is the initial cost, the conduit alone costing from \$50,000 to \$80,000 per mile of single track. The conduit must be made large, it is difficult to clean, the pressure is liable to distort it and close the slot; its depth — varying from two to three feet — is liable to interfere with steam, gas, or water pipe. A break in the cable will suspend the entire traffic on the line. A broken strand is apt to foul the grip and pile one car on another, as has happened in Philadelphia. The efficiency of the system is not over twenty to twenty-five per cent, while to guard against accident the engine outfit is usually from two to four times that required at any time. Any extension of a cable line is expensive because the length of the cable is fixed. The speed of the cars is limited to that of the cable, so there is no chance for them to catch up if they get behind time; the motion, too, is uneven and unpleasant.

For electric traction Mr. Sprague claims the following advantages. It will do the work more satisfactorily and at a less cost than horses; on levels and up and down grades electric-motor cars can be run much faster than horse-cars; they can be gotten under way and stopped much more quickly; the equipment will occupy thirty-five per cent less space than horse-cars, the horse space being saved, and this fact, together with the ability to back when necessary and to quickly gain headway, enables an electric car in a narrow and crowded street to work a passage through where horse-cars would be stopped. Electric cars can be run more safely on down grades, since if the brake-chain breaks the car can be controlled by the motors, reversing when necessary. The motion of an electric car is smooth, and its starting and stopping are easy; the cars are clean, they can be lighted and heated by electricity; the streets are cleaner, and objectionable stables are not needed. It becomes feasible to operate branch lines, and also combinations of grades, curves, and ill-conditioned streets, that would be prohibitory to any other system.

To the objections that have been urged against electric systems, — that an extended system cannot be operated by electricity, that the lines may break down, that a large number of cars cannot be operated simultaneously, especially when bunched up, and that armatures and brushes burn up, — Mr. Sprague opposes his own very extensive experience, especially in the case of the Union Passenger Railroad in Richmond, where all of these difficulties have been met and overcome.

Before giving the details of the Richmond road, Mr. Sprague explained from curves some important points in the theory of electric motors for traction work. Discussing the different methods of gearing the armature of the motor to the axles of the car wheels in order to reduce the velocity, he concludes that there is only one good way, which is to centre the motor on the axle, suspending it flexibly from the car body or truck, and driving the axle by gearing with one or two reductions according to the nature of the service.

Taking up the methods of supplying the current to the motors, from storage-batteries on the cars, from overhead wires, or from wires in a conduit underground, Mr. Sprague first discusses storage batteries. These he considers as extremely promising for surface traction, but at the present state of development the excessive weight, the depreciation and cost, lack of capacity, and the space taken up in the car, make their success problematic. The weight of the car is so great — almost 20,000 pounds for a loaded car — that many of the tracks now in use would have to be rebuilt for them.

The difference in cost between an overhead and conduit system is mainly in the cost of the conduit, \$25,000 to \$30,000 a mile. The latter has the advantage that there are no overhead obstructions, and it can therefore be used in streets where the former is not permitted. Its disadvantages are cost, possibilities of leakage, and difficulty in cleaning and repair.

The overhead system is cheap, easily insulated and repaired; if properly constructed it need not be unsightly nor dangerous, — in fact the electrical pressure should not be great enough to endanger life. Mr. Sprague recommends this system for suburban districts, for comparatively narrow streets, for all streets operating under an elevated railroad structure, or where the tracks are near a sidewalk.

To illustrate the advantages of electricity for certain classes of traction work, Mr. Sprague proceeded to describe the equipment and operation of the Richmond street railroad, a description of which has appeared in this journal. The road is a difficult one, practically impossible for horse traction. There are grades of over ten feet in a hundred, and curves of small radius on heavy grades. The total trackage is twelve miles, the equipment is forty cars. Each car axle is geared to a motor of $7\frac{1}{2}$ -horse power, capable of working up to 15-horse power if required. The motors are out of sight, and are practically noiseless. The system used is the overhead. The power station is in the middle of the line, and is provided with boilers and engines of 375-horse power. In distributing the current a main conductor is taken along the line of track, either on the poles or underground, and is connected at intervals to the overhead working conductor, from which the current is taken. This allows a small overhead wire, and a break in it will not interrupt the traffic on the line. The return circuit is through the car-wheels to the rails and the earth. This road has been running long enough to allow reliable figures as to the expense being obtained. It is found that the cost of power is \$1.48 per car day, the car making eighty miles, and of material, labor, and depreciation, \$1.98 per car day; the total being \$3.46 per car day, or 4.32 cents per car mile. This is to be compared with the ten cents a car mile that horses cost, and in the latter estimate there is no allowance for depreciation of cars, etc. At present there is a saving in this line of \$125 a day as compared with horses. The passengers carried are over 10,000 per day.

Passing to the application of electricity on a larger scale, Mr. Sprague considers the problem of the elevated roads. At present steam engines weighing $22\frac{1}{2}$ tons, with a capacity of 185-horse power are used. For a proper service the number of cars should be increased at certain hours, but the weight of the locomotive will not give traction enough for the desired increase, and the strength of the structure will not allow an increase in its weight. As to the energy used, 59 per cent is employed in starting, 24 per cent in lifting, 17 per cent in traction; the average horse power is 70.3. Mr. Sprague's substitute for the locomotive is a car with an electric motor geared to each axle. In stopping and in going down grades he will brake by making his motors into dynamos, feeding current into the line for the other trains, thus recovering a part of the energy lost in starting and in going up grade. The motors are to have a collective capacity of 300-horse power, and the car will be used for passengers: at each end of it will be a compartment for the motor men.

Mr. Sprague's ideal railroad system for New York is as follows: There would be four tracks from the Battery up Broadway to Twenty-third street; thence diverging in two divisions, each still with four tracks, one along the line of Madison Avenue to the Harlem River; the other following Broadway and running up the line of the Boulevard and Tenth or Eleventh Avenue. Two tracks would be for express, two for way traffic: they would be in two tiers, the former below the latter. Electric cars are to be used, the current delivered from an overhead wire; express speed, thirty miles, way trains, twelve miles per hour. This system is to be supplemented by surface cars operated by electricity.

These are the main points in Mr. Sprague's paper, which will be discussed in the fall meeting of the Institute of Electrical Engineers.

MENTAL SCIENCE.

Experiments in Thought-Transference.

THE English Society for Psychical Research has definitely accepted the theory of telepathy, or a mode of communication between mind and mind other than that through the recognized channels of sensation. A portion of the evidence upon which they found that belief is of an experimental nature, and it is this portion that is most apt to arouse the attention of scientific men; it is this portion, too, that is certain to bring to light obscure phases of mental action, irrespective of the answer it may yield as to the possibility or impossibility of thought-transference. In the last issue of the Proceedings of the English Society (June, 1888), M. Charles Richet, well known as a physiologist, and editor of the

Revue Scientifique, contributes a full account of his varied and elaborate researches in this new field.

These experiments, coming from so eminent an experimenter, made with a sound knowledge of the sources of error inherent in such work, and presented with a pleasant modesty, are worth the consideration equally of those who do not agree with the conclusions of M. Richet¹ and of those whose views are strengthened by these new experiments. M. Richet has been pursuing this investigation for six years, and, if he has been deceived by his subjects, it can only be that the topic presents an unusually puzzling and deceptive aspect.

After an introduction dealing with the precautions to be taken, and emphasizing the fact that at bottom we must trust to the honesty of our subjects, he can do no better than ask the reader to take his word for the observed good faith of the subjects, and equally well assure the reader that he has ever been on his guard against that greatest of wonder-workers, 'unconscious self-deceptions.' Furthermore, we must require only such a degree of probability for our results as would be satisfactory in other sciences. The slightest defect invalidates the whole observation, and a well-established, not very wonderful result is to be preferred to a striking one less securely established.

His subjects are four hysterical women between the ages of twenty-one and forty-five, all subject to hypnotism, and some with a tendency to natural somnambulism, and other signs of an unstable nervous constitution. The first test consisted in willing the patient to go to sleep, M. Richet being at a house five hundred and fifty yards distant. On going to the house he puts the subject to sleep, and she tells him that for a certain twenty minutes of the morning he was trying to put her to sleep, and that she went to sleep. The time is approximately correct. The experiment is varied, and the coincidence of the time of M. Richet's willing and of the patient's sleeping varies from a remarkable exactness to quite wide approximations. However, M. Richet is convinced that the successes are more numerous than can possibly be explained as due to chance. Between coincidence and telepathy, he chooses the latter.

Very many attempts were made to transfer a simple drawing from M. Richet's mind to that of the subject. Many illustrations of the result are figured, and without such illustrations it is useless to describe the result. But the new fact that M. Richet records is that the experiment succeeded nearly or quite as well when he was ignorant of the design contained in the envelope as when he knew it. Here thought-transference is out of the question, and M. Richet has recourse to the theory of a sort of clairvoyance to which he gives the generic name of 'lucidity,' a vision in which the ordinary optical impediments no longer act as such. It must be added, that as a rule the subject did not draw her reproduction, but described it part by part, and it was drawn by M. Richet. Selections from the most successful sixth of the results are alone described. Moreover, the very admirable plan was adopted of experimenting with normal subjects by selecting sixty designs, and recording the good results. For seven successes in two hundred with these subjects, he can show twenty with his selected subjects, so that the normal degree of success is to some extent ascertained.

Another and very questionable form of test was to have the subject, either in a normal or hypnotic state, describe the disease of a patient thought of, or a lock of whose hair was shown. The descriptions are in vague terms, and the amount of success is by no means remarkable.

Experiments were made in which the letters of an alphabet are moved over by one person, while a group of persons sit at a table, and the letters are recorded at which the pen stopped when the table moved under the more or less unconscious impulse of the sitters. When these letters are put together, they form a more or less close resemblance to what was thought of or asked for. The fact that sentences thus emerge, if fact it is, is certainly extremely wonderful.

Experiments with cards were tried; and the success in guessing the color, the suit, and the grade, compared with the success by

chance, yields the result that no evidence of 'lucidity' is present. The guessing of names was no more successful. Other observations of a miscellaneous character, and dealing with coincidence, are recorded. These give one the feeling that a great many wonderful things have been happening to M. Richet since he has become interested in this study.

M. Richet takes the position that chance or a new mode of mental action is the only way of explaining the results. This is far from self-evident. On the contrary, it is infinitely more probable that a natural mode of explanation has escaped our observation, and especially so in this unexplained region of mental phenomena. We know, as M. Richet points out, how very shrewd subjects are in anticipating results by unconscious suggestion, and the limits of this power have by no means been reached. We ought, then, to so arrange our experiments that this power finds no field for application. It is not sufficient to refrain from all conscious intimation of the expected result, but this result must not be capable of any such intimation. It is in this point that M. Richet's experiments are sadly deficient. Instead of finding when his subject went to sleep by her account of it, let a schedule be arranged that five times per day for a period of fifteen minutes he should will the distant subject to sleep; then let the hours be determined by hazard, and record the result. Everywhere we require simplicity of conditions with the amount of success due to chance precisely calculable. It is striking that the card experiments, which alone answer this condition, are entirely negative in result. Again, the drawing experiments are useless until we have a system of calculating successes. The designs are largely the combination of a few elements; and if, as M. Richet at times does, we calculate the appearance of one of these elements as a partial success, it is easy to prove telepathy. Finally (for objections could be indefinitely multiplied), the inference from the fact that success was obtained when the operator did not do the drawing, is not that we must suppose lucidity, but that this is excellent evidence against telepathy, and strongly suggests that the percipient has some method of seeing enough of the design to get three times as many as the normal number of successes. The problem is by no means a simple one, and theories of any kind are premature. In maintaining a scientific interest in such phenomena the Psychic Research Society is performing a very useful function.

THE PSYCHOLOGY OF SPIRITUALISM.—In the July number of the *American Magazine*, Dr. Allan McLane Hamilton writes to the point in reference to the delusion which has recently figured in the law courts. He shows the relationship of this to other psychic delusions, and describes the conditions under which false mental images arise, and lead to the weakening of the judgment.

BOOK—REVIEWS.

The Constitution of the United States, with notes. EDWIN D. MEAD. Boston, Heath. 16°.

THE proprietors of the Old South Meeting House established in 1883 a series of lectures on historical and political subjects, with the special object of instructing the young. The lectures have proved popular, and are doubtless doing good; so that the hope is now entertained that they will be permanently continued, and will give rise to other courses of like character elsewhere. In connection with these lectures a series of pamphlets have been issued, called the 'Old South Manuals,' of which this copy of the *National Constitution* is one. It is of convenient size and well printed. The notes are historical and bibliographical, and though of necessity brief, they convey a good deal of information, and will be specially valuable as showing the student where to go for further instruction. The editor of the work, as well as the managers of the lectures, take a broad view of the subject with which they deal, and are not among those who think that American history and politics can be studied apart from those of the world in general. The vital connection of our institutions with those of England is fully apprehended by Mr. Mead, and several of his notes are devoted to this subject. The leading authorities on both English and American constitutional history are pointed out, and the student who wishes to pursue the subject thoroughly will find this little book a sufficient and trustworthy guide.

¹ The present writer counts himself among this number, and, inasmuch as it is impossible to eliminate individual opinion in so new a question, will criticise the experiments from this negative point of view.

NOTES AND NEWS.

ALL intending to be present at the meeting at Cleveland of the American Association should write to the Local Committee, 407 Superior St., for a copy of their circular giving full particulars of the course to be pursued in order to benefit by reduced fares. Certain conditions must be fulfilled before reaching the meeting.

— Jean-Charles Houzeau de Lehaie, honorary director of the Royal Observatory at Brussels, died at Schaerbeek, July 12. He was born at Mons on the 7th of October, 1820.

— Courtlandt Palmer died, July 23, at the Lake Dunmore House, Lake Dunmore, near Brandon, Vt., of peritonitis. Mr. Palmer will be remembered as the founder of the Nineteenth Century Club, a debating society devoted to the discussion of social, literary, artistic, theological, and scientific problems in the spirit of the broadest liberality, which has been held together for more than five years by the force of his energy and enthusiasm. Mr. Palmer has always been the president of this organization. Its first meeting was held at his residence, in Gramercy Park, in January, 1883, and for some time afterward the membership of the club was small enough to enable the president to offer to it the hospitality of his home. But the membership increased, and it became the fashion in polite society to attend the club meetings. The rooms of the American Art Association, on Madison Square, were secured, and half a dozen meetings were held every winter. Last season the club changed its meeting place to the handsome assembly rooms of the Metropolitan Opera House. There is no question that the Nineteenth Century Club has done good work. Mr. Palmer's enthusiastic devotion to his society never relaxed. By profession he was a lawyer, and he was born in this city forty-five years ago.

— The July–August number of *The Art Review* begins Vol. III. of the magazine and the new series of bi-monthly issues. The latter mode of publication will not only allow more time and care in the preparation of the 54 art supplements given annually by the magazine (6 etchings, 6 wood-engravings, and 42 full-page photogravures reproducing American scenery, paintings, statuary, architecture), but will also be better adapted to the review character of the articles, — descriptive and critical accounts of the more important exhibitions in New York and elsewhere, of our public art museums and private galleries, of picturesque American scenery, of the art status of leading American cities, of American architecture and industrial art, of American prints, coins, etc., as well as articles on general art topics, embracing both foreign and American art. In conformity with the reduction in the number of issues per annum, the subscription price is reduced from \$10.00 to \$7.50 a year. — Encouraged by the cordial reception given to *The Art Review*, the editor and publisher of the *Review* (Mr. George Forbes Kelly) will begin in September next a new art periodical, entitled *The Art Courier*, issued twice a month, or 24 times a year. This publication will aim to give the art news of the fortnight, presented in readable style, with brief editorial comments. Each number will have, as its art supplement, a photogravure, and these 24 plates will be furnished with the letter-press for the low price of \$4.00 a year. — Of the series of railway articles in *Scribner's Magazine*, the third, entitled 'American Locomotives and Cars,' by M. N. Forney, will appear in the August number, and will be entirely different in subject-matter, treatment, and illustration from the two preceding articles, which dealt with the construction of the road-bed. Mr. Forney will describe the evolution of the modern locomotive from Peter Cooper's engine, which weighed less than a ton, and the typical passenger car from the old stage-coach. — In the August number of the *Atlantic Monthly* two timely and practical contributions, which will be given close attention just now, are Horace E. Scudder's article on 'Literature in the Public Schools,' and a review of the new book of 'Political Essays,' by James Russell Lowell. Another practical contribution is furnished by President Eliot of Harvard under the caption 'Can School Programmes be Shortened and Enriched?' — The new number of Ticknor's admirable Paper Series of original copyright novels is 'The Rise of Silas Lapham,' by W. D. Howells. — *The Popular Science Monthly* is doing splendid service in showing the aspect of the great questions of the day from the scientific standpoint. The August number opens with an article entitled 'The Octroi at Issoire: a City made Rich by Taxa-

tion,' by President Jordan of the University of Indiana, which gives the imaginary history of a French town that sought prosperity through a high tariff. — The article, 'A Rare Fish,' in *Outing* for August deals with the salmon fishing of the Saguenay River. — In the August *Magazine of American History* 'The Conquest of the Mayas' is the fourth and concluding paper in Mrs. Alice D. Le Plongeon's historical sketches of Yucatan.

— The first report of this season's work has been received at the Hydrographic Office from the United States steamship 'Ranger.' The preliminary triangulation of Sebastiano Viscaino Bay, Lower California, has been completed. In order to make this triangulation, a party was left at Lagoon Head, in camp, with a heliostat constructed on board the 'Ranger' by using a state-room mirror. The flash was seen and cut in from Cerros, sixty miles distant, on a remarkably clear day, so that the triangulation was easily connected with a system of well-conditioned triangles to the base line measured at San Bartolomé Bay. The heliostat furnished to the ship is effective for a distance of forty miles, but could not be seen from Cerros. The aggregate length of the sides of the various triangles constructed was about a thousand miles, and the length of coast line surveyed, one hundred and nineteen miles. Ten places were occupied on the coast for the determination of the magnetic declination. The observations at Rosalia Bay show that the point of maximum easterly deviation has passed, and that now the declination is decreasing at that place. The hydrography is completed to Point San Eugenio. The great bay of San Sebastian Viscaino is well sounded out, and the east coast of Cerros Island is finished to within three miles of the north end.

LETTERS TO THE EDITOR.

A Pseudometeorite.

ON JUNE 26 the Minneapolis, Minn., *Tribune* printed a special despatch from Rochester, Minn., stating that a meteorite weighing 203 pounds had fallen on the premises of Mr. A. Sias of that place; that the stone measured 20 inches in length and 12 inches in thickness, and was covered with a black varnish-like coating.

A small piece was kindly sent me by the owner, who also informed me that it was found in a gully which had about eighteen months ago been washed out by a freshet and since then had filled in with limestone. On this pile he found what he believed to be a meteorite.

The fragment sent is red hematite, probably from the Lake Superior region, and not of meteoric origin.

The finders still believe it to be a meteorite, because they cannot see how a mass of hematite could reach there. It is probable that this mass was left in an ore car and thrown out at the limestone quarry where limestone was obtained for flux, and subsequently carted from there with the limestone used in filling up the gully.

GEORGE F. KUNZ.

New York, July 23.

Professor Loizette's Memory.

I AM glad that in your issue of July 20 you properly characterized 'Professor' Loizette's memory system and methods. I am one who started to become a pupil by 'correspondence,' and ended by becoming a victim. Having received, after the proper payment, the 'secret' lessons, I proceeded according to directions and transmitted a copy of my work for correction as per contract. Did I receive any attention? Not the least. Another letter, enclosing the proper stamps and explaining the first, drew no further response than a duplicate copy of the printed lessons and a pamphlet of useless advertisements. The 'Professor,' who had been so ready to receive my fee, did not deign, in person or by clerk, write a word, and I became conscious that I had been swindled. It is time, as you suggest, that I ought to have known better; but the most cautious are sometimes 'taken in,' and become an illustration of the adage that 'a fool and his money are soon parted.' However, although at considerable cost, I admit that the 'Professor' has improved my memory to that extent, and if I may serve as a warning to others, my experience may not be without its benefits.

CHARLES FLUHRER.

Grand Rapids, Mich., July 23.